UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/367,153	08/09/1999	ALASTAIR SIBBALD	62-194	3951

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EXAMINER
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ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/367,153	SIBBALD ET AL.
	Examiner	Art Unit	
	Devona E. Faulk	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>25 January 2005</u>.

2a)☒ This action is **FINAL.** 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-43 and 45-52* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-43 and 45-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments filed 1/25/2005 have been fully considered but they are not persuasive. The applicant has amended claims and essentially asserts that the prior art fails to teach of a separate gain adjustment. The examiner disagrees. The examiner asserts that the applicant's admitted prior art, Figure 8, teaches of an interaural time delay or interaural time difference (ITD) will also have associated with it an interaural intensity difference, i.e., a difference in the magnitude of each HRTF. An ITD thus means a time difference and a magnitude difference (generally) and it is clear that the greater distance has a lesser magnitude. It is known that the distance from the sound source to the left ear and the distance from the sound source to the right ear are not the same because the left and right ear are at different positions and one would be closer to the sound source than the other. The examiner asserts that it is obvious therefore that any gain calculations would be done separately to accommodate the different values in distance. Furthermore, the Begault reference further discloses the concept of separately applying a magnitude to a left and right channel. The examiner is maintaining her rejection.

2.   Applicant's arguments filed 1/25/2005, with respect to the 112 rejections of claims 15-17,23,24,34,40,45-47 and 50-52 have been fully considered and are persuasive. The 112 rejections of claims 15-17,23,24,34,40,45-47 and 50-52 have been withdrawn.

3.   Claims 1-14 and 44 are cancelled.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims **15,16,18,20,24,26,28,30,34,40,45,46,48,50** are rejected under 35 U.S.C.

103(a) as being unpatentable over the applicant's admitted prior art (page 2, line 23;

Figure 8) in view of Begault (3D Sound For Virtual Reality and Multimedia).

Claims 15-17,23,34,40,45-47,50-52 share common features.

Regarding claims 15-17.23.34.40.45-47.50-52, the applicant's admitted prior art,

Figure 8, discloses a method of processing a single channel audio signal corresponding

to a sound from a sound source located a source position relative to a preferred position

of a listener, and using at least one of a plurality of head responses transfer functions

(Figure 8) comprising:

Providing a right channel signal and a left channel signal from said single

channel audio signal (Figure 8,page 2, line 23);

Modifying each of said right channel signal and said left channel signal by

applying separately at least one of a plurality of head response transfer functions (left-

ear transfer function, right-ear transfer function; Figure 8, page 2, line 23);

Introducing a time delay between said right channel signal and said left channel

signal to provide cues to perception of a direction of said source position relative to said

preferred position of said listener at a given, time said time delay corresponding to an

inter-aural time delay of said sound from said sound source with respect to said listener

and associated with the at least one of the plurality of head response transfer functions

(applicant's admitted prior art, Figure 8).

The applicant's admitted prior art fails to disclose modifying each the left and

right channel separately a gain adjustment and wherein the gain adjustment comprises

choosing respective values for magnitude of said left channel signal and magnitude of

said right channel signal to provide cues for perception of a distance of said source

position from said preferred position at said given time; said respective values for

magnitude of said left channel signal and said magnitude of said right channel signal

being chosen separately, each based on the distance from the sound source to the

respective one of the left and right ears of the listener.

However this concept was well known in the art as taught by Begault. Begault

discloses in Figures 2.14 and 2.15 (pages 46-48), the concept of having different

magnitudes for the left and right ear based on distance. The inter-aural time

difference, as taught by the applicant's admitted prior art (Figure 8), describes the time

delay between sounds arriving at the left and right ears. As shown by Begault (Figure

2.14, page 47), the magnitude components of the HRTFs to the left and right ears for a

given virtual location, in this case left 90° azimuth, are different; the one, in this case, for

the right ear is clearly, less than that for the left or closer ear. The left and right ears are

not the same distance from the source. Begault further discloses having separate

magnitudes or gain parameters for each channel (page 145) and teaches that the gain

or magnitude is based on distance (page 137). An interaural time difference (ITD) will also have associated with it an interaural intensity difference, i.e., a difference in the magnitude of each HRTF. An ITD thus means a time difference and a magnitude difference (generally) and it is clear that the greater distance has a lesser magnitude. It would have been obvious to one of ordinary skill to modify the applicant's admitted prior to separately adjust gain in order to yield gain that accurately depicted a listening environment.

The examiner notes that the last paragraph of claim 15, which does not imply the existence of a separate step or structure to impact a magnitude difference to HRTFs, is inherently met by typical HRTFs for left and right ears. Thus employing such typical HRTFs inherently amounts to choosing said respective values of magnitude as claimed.

Regarding **claim 16**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above apropos of claim 15, with the exception of "said respective values for magnitude of said left signal and said magnitude of said right signal being determined on an inverse of square of distance between said source position and respective ears of said listener". Begault teaches of the inverse square law for intensity vs. distance (Figure 3.1; page 70-71). It is obvious that since distances can be determined from the gain, that the reverse is true and the magnitude can be determined from the distance. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use sound's inverse square law for intensity vs. gain in order to determine the coordinates of the external sound source.

All elements of **claim 18** are comprehended by claim 16. Therefore, claim 18 is rejected for reasons given above apropos of claim 16.

Regarding **claims 20, 30 and 40**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claims 24 and 34 respectively, with the exception that at least one of said left signal and said right signal is sufficiently small as to be inaudible. This would be a matter of choice as to if one wanted one of the signals to be inaudible. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to make one of signals inaudible for the benefit of having sound produced to one ear.

Regarding **claim 24**, the combination of the applicant's admitted prior art and Tanner meet all elements of that claim, as stated above in apropos of claim 15, with the exception that there is a computer readable storage medium having a program with instructions. Begault further teaches the concept of a program that enables the process. There obviously would have to be a computer readable medium of some sort to enable the program to run. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use a computer program to implement the processing is for the benefit of producing a more robust virtual sound image.

Claim 26 claims the computer readable storage of claim 24. Regarding **claim 26**, the combination of the applicant's admitted prior art and Begault meet all elements of that claim, as stated above in apropos of claim 15, with the exception that the respective values for magnitude of said left signal and said magnitude of said right signal are determined based on an inverse of square of a distance between source position and

respective ears of listeners. Begault teaches of distances determined by the sound intensities using the inverse square law for intensity vs. distance (Figure 3.1. pages 70-71). It is obvious that since distances can be determined from the gain, that the reverse is true and the magnitude can be determined from the distance. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use sound's inverse square law for intensity vs. gain in order to determine the coordinates of the external sound source.

All elements of **claim 28** are comprehended by claim 24. Therefore, claim 24 is rejected for reasons given above apropos of claim 24.

Regarding **claim 34**, the combination of the applicant's admitted prior art and Begault meet all elements of that claim, as stated above in apropos of claim 15, with the exception that there is an apparatus performing the method. All elements of claim 34 are the same as those of claim 15. Therefore claim 34 is rejected for reasons given above apropos of claim 15.

Claim 36 claims the apparatus of claim 34. Regarding **claim 26**,the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 15, with the exception that the respective values for magnitude of said left signal and said magnitude of said right signal are determined based on an inverse of square of a distance between source position and respective ears of listeners. Begault teaches of distances determined by the sound intensities using the inverse square law for intensity vs. distance. It is obvious that since distances can be determined from the gain, that the reverse is true and the magnitude can be

determined from the distance. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use sound's inverse square law for intensity vs. gain in order to determine the coordinates of the external sound source.

All elements of **claim 38** are comprehended by claim 36. Therefore, claim 36 is rejected for reasons given above apropos of claim 36.

Regarding **claim 45**, the applicant's admitted prior art as modified by Begault meets all elements of this claim, as stated above apropos of claim 15. Begault also reads on "said respective values for magnitude of said left signal and said magnitude of said right signal are being chosen separately". It is obvious that you would use the respective values of magnitude of the left and right signal to provide cues for perception of the source position from the preferred position at said given time because the distance from sound source differs for the left and right ear and the goal is to achieve the best possible and most accurate sound. Thus, it would have been obvious to one of ordinary skill in the art to choose respective values of magnitude of said left and right channel as claimed in order to provide improved virtual sound images.

Regarding **claim 46**, the applicant's admitted prior art as modified by Begault meets all elements of this claim, as stated above apropos of claim 15, with the exception of "said respective values for magnitude of said left signal and said magnitude of said right signal being determined on an inverse of square of distance between said source position and respective ears of said listener". Begault teaches of distances determined by the sound intensities using the inverse square law for intensity vs. distance (Figure 3.1, pages 70-71). It is obvious that since distances can be

determined from the gain, that the reverse is true and the magnitude can be determined

from the distance. Therefore, it would have been obvious to one of ordinary skill in the

art at the time of the invention to use sound's inverse square law for intensity vs. gain in

order to determine the coordinates of the external sound source.

All elements of **claim 48** are comprehended by claim 46. Therefore, claim 48 is

rejected for reasons given above apropos of claim 46.

Regarding **claim 50**, the combination of the applicant's admitted prior art and

Begault meets all elements of that claim, as stated above in apropos of claim 15, with

the exception that at least one of said left signal and said right signal is sufficiently small

as to be inaudible. This would be a matter of choice as to if one wanted one of the

signals to be inaudible. Thus it would have been obvious to one of ordinary skill in the

art at the time of the invention to make one of signals inaudible for the benefit of having

sound produced to one ear.

6.   **Claim 17,19,23,25,27,29,35,37,39,47 and 49** are rejected under 35 U.S.C.

103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure

8) in view of Begault (3D Sound For Virtual Reality and Multimedia) in further view of

Raydon et al. (U.S. Patent 3,969,588).

Regarding **claim 17**,the combination of the applicant's admitted prior art and

Begault meets all elements of that claim, as stated above in apropos of claim 15, with

the exception of the step of choosing respective values for magnitude of said left signal

and magnitude of said right signal comprises providing a look-up table having thereon

distances between said source position and respective ears of said listener, said

distances corresponding to associative ones of said values for magnitude of said left

signal and said magnitude of said right signal and selecting said values for magnitude

from said look-up table. Raydon discloses a look-up table having gain settings as a

function of distance (column 19, lines 59-64). This reads on the claimed matter. Using a

computer program to implement the processing is obvious for the benefit of having the

most precise and accurate data and to have stable operations. It would have been

obvious to use Raydon's concept of having a look-up table to retrieve values for the

benefit of reducing processing time.

Claim 19 claims the method of claim 18, wherein said step of choosing

respective values for magnitude of said left signal and magnitude of said right signal

further comprise providing a look-up table having therein values of magnitude

corresponding to distances between said source position and respective ears of said

listener and selecting said values for magnitude from said look-up table bases on said

interaural time difference. The inter-aural time difference, as taught by the applicant's

admitted prior art (Figure 8), describes the time delay between sounds arriving at the

left and right ears. It is well known in the art that inter-aural time difference is a source of

localization cues. The applicant's admitted prior art teaches of the interaural delay.

Raydon discloses a look-up table having gain settings as a function of distance (column

19, lines 59-64). This reads on the claimed matter. Using a computer program to

implement the processing is obvious for the benefit of having the most precise and

accurate data and to have stable operations. It would have been obvious to use

Raydon's concept of having a look-up table to retrieve values for the benefit of reducing processing time.

Regarding **claim 23**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 15, with the exception that the respective magnitudes are determined by reference to a lookup table using the inter-aural time delay to determine the respective values for magnitude". Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). This reads on the claimed matter. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. It would have been obvious to use Raydon's concept of having a look-up table to retrieve values for the benefit of reducing processing time.

Claim 25 claims the computer readable storage of claim 24. Regarding **claim 25**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 15, with the exception that the respective magnitudes are separately determined by using an inter-aural time difference as an input parameter for a lookup table having magnitude values based on the distance from the sound source to the respective one of the left and right ears of the listener. Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). This reads on the claimed matter. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. It would have been obvious to use

Raydon's concept of having a look-up table to retrieve values for the benefit of reducing processing time.

Claim 27 claims the computer readable storage of claim 24. As stated above apropos of claim 24, the combination of the applicant's admitted prior art and Begault meets all elements of that claim. Therefore, the combination meets all elements of claim 27 with the exception that the instructions for choosing respective values for magnitude of said left signal and magnitude for said right signals include instructions for providing a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal and selecting said values for magnitude from said look-up table. Raydon discloses a look-up table having gain reads on the claimed matter. Begault further teaches the concept of using a program to perform the processing (Figure 5,15; pages 179-181). Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. There would obviously have to be a computer readable medium. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use a computer program to implement the processing is for the benefit of producing a more robust virtual sound image.

Claim 29 claims the computer readable storage of claim 24. As stated above apropos of claim 28, the combination of the applicant's admitted prior art and Begault meets all elements of that claim. Therefore, the combination meets all elements of

claim 27 with the exception that the instructions for choosing respective values for magnitude of said left signal and magnitude for said right signals include instructions for providing a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal and selecting said values for magnitude from said look-up table. Raydon discloses a look-up table having gain reads on the claimed matter. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. It would have been obvious to modify the apparatus of the combination of the applicant's admitted prior art and Tanner by having a look-up table to retrieve values for the benefit of reducing processing time.

Claim 35 claims the apparatus of claim 34, wherein said means for choosing said respective values is adapted to choose said respective values for magnitude of said left signal and said magnitude of said right signal separately by using an inter-aural time difference as an input parameter for a lookup table having magnitude values based on the distance from the sound source to the respective one of the left and right ears of the listener. As stated above apropos of claim 34, the combination of the applicant's admitted prior art and Begault meet all elements of that claim. Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). It would have been obvious to use Raydon's concept of having a look-up table to retrieve values for the benefit of reducing processing time.

Claims 37 and 39 claim the method of claims 34 and 38 respectively, wherein said means for choosing respective values for magnitude of said left signal and magnitude of said right signal further comprises a look-up table having thereon values for distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude of said left signal and said magnitude of said right signal; means for selecting said values for magnitude from said look-up table. The inter-aural time difference, as taught by the applicant's admitted prior art (Figure 8), describes the time delay between sounds arriving at the left and right ears. It is well known in the art that inter-aural time difference is a source of localization cues. The applicant's admitted prior art teaches of the interaural delay. Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). This reads on the claimed matter. It is obvious to have a means to retrieve the data. Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. It would have been obvious to use Raydon's concept of having a look-up table to retrieve values for the benefit of reducing processing time.

Regarding **claim 47**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 45, with the exception said respective values for magnitude of said left signal and magnitude of said right signal are chosen by selecting said values for magnitude from a look-up table having thereon distances between said source position and respective ears of said listener, said distances corresponding to associative ones of said values for magnitude

of said left signal and said magnitude of said right signal and selecting said values for

magnitude from said look-up table. Raydon discloses a look-up table having gain

settings as a function of distance (column 19, lines 59-64). This reads on the claimed

matter. It would have been obvious to use Raydon's concept of having a look-up table

to retrieve values for the benefit of reducing processing time.

Claim 49 claims the audio signal of claim 48, wherein said respective values for

magnitude of said left signal and magnitude of said right signal are chosen by selecting

values for magnitude from said look-up table having thereon values for distances

between said source position and respective ears of said listener, said distances

corresponding to associative ones of said values for magnitude of said left signal and

said magnitude of said right signal. The inter-aural time difference, as taught by the

applicant's admitted prior art (Figure 8), describes the time delay between sounds

arriving at the left and right ears. It is well known in the art that inter-aural time

difference is a source of localization cues. The applicant's admitted prior art teaches of

the interaural delay. Raydon discloses a look-up table having gain settings as a

function of distance (column 19, lines 59-64). This reads on the claimed matter. Using a

computer program to implement the processing is obvious for the benefit of having the

most precise and accurate data and to have stable operations. It would have been

obvious to use Raydon's concept of having a look-up table to retrieve values for the

benefit of reducing processing time.

7.   **Claims 21,31,41 and 51** are rejected under 35 U.S.C. 103(a) as being

unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of

Begault (3D Sound For Virtual Reality and Multimedia) in further view of Abel et al. (U.S.

Patent 6,009,178).

Regarding **claim 21**,the combination of the applicant's admitted prior art and

Begault meets all elements of that claim, as stated above in apropos of claim 15, with

the exception of the left signal and the right signal are compensated to provide at least

one of a cancellation and a reduction of transaural crosstalk when said left signal and

said right signal are supplied through said left channel and said right channel

respectively for replay by loudspeakers. Abel teaches of a system and method for

providing a two-channel signal to the ears of a listener through an audio system

comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to

deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore,

Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the

art and is essential and critical to all head-related transfer function (HRTF) based 3D

sound systems.   Thus it would have been obvious to one of ordinary skill in the art at

the time of filing to use transaural crosstalk for the benefit of delivering clean left and

right channel binaural signals to the ears of the listener.

Regarding **claim 31**,the combination of the applicant's admitted prior art and

Begault meets all elements of that claim, as stated above in apropos of claim 24, with

the exception that the left signal and the right signal are compensated to provide at least

one of a cancellation and a reduction of transaural crosstalk when said left signal and

said right signal are supplied through said left channel and said right channel

respectively for replay by loudspeakers. Abel teaches of a system and method for

providing a two-channel signal to the ears of a listener through an audio system

comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to

deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore,

Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the

art and is essential and critical to all head-related transfer function (HRTF) based 3D

sound systems.   Using a computer program to implement the processing is obvious for

the benefit of having the most precise and accurate data and to have stable operations.

Thus it would have been obvious to one of ordinary skill in the art at the time of filing to

use transaural crosstalk for the benefit of delivering clean left and right channel binaural

signals to the ears of the listener.

Claim 41 claims the apparatus of claim 34 further comprising a compensating

means for providing at least one of a cancellation and a reduction of transaural crosstalk

in said left signal and said right signal when said left signal and said right signal are

supplied through said left channel and said right channel respectively for replay by

loudspeakers. Abel teaches of a system and method for providing a two-channel signal

to the ears of a listener through an audio system comprising a crosstalk removal circuit

(303; Figures 3A and 3B). Transaural means to deliver binaural signals to the ears of a

listener using stereo loudspeakers. Therefore, Abel's system reads on the claimed

matter. Crosstalk cancellation is well known in the art and is essential and critical to all

head-related transfer function (HRTF) based 3D sound systems. Thus it would have

been obvious to one of ordinary skill in the art at the time of filing to use transaural

crosstalk for the benefit of delivering clean left and right channel binaural signals to the ears of the listener.

Regarding **claim 51**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 45, with the exception that said left signal and the right signal are compensated to provide at least one of a cancellation and a reduction of transaural crosstalk when said left signal and said right signal are supplied through said left channel and said right channel respectively for replay by loudspeakers. Abel teaches of a system and method for providing a two-channel signal to the ears of a listener through an audio system comprising a crosstalk removal circuit (303; Figures 3A and 3B). Transaural means to deliver binaural signals to the ears of a listener using stereo loudspeakers. Therefore, Abel's system reads on the claimed matter. Crosstalk cancellation is well known in the art and is essential and critical to all head-related transfer function (HRTF) based 3D sound systems. Thus it would have been obvious to one of ordinary skill in the art at the time of filing to use transaural crosstalk for the benefit of delivering clean left and right channel binaural signals to the ears of the listener.

8.   **Claims 22, 32,33,42,43,52 and 53** are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (page 2, line 23; Figure 8) in view of Begault (3D Sound For Virtual Reality and Multimedia) in further view of Sibbald et al. (U.S. Patent 5,666,425).

Regarding **claim 22**, the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 15, with

the exception of combining said left signal and said right signal with other two or more

channel audio signals.   Sibbald discloses plural sound processing where a left and right

channel (36 and 38) are added to equalized left and right signal (44 and 46) using

adders 48 and 50. This reads on "combining said left and said right signal with other

two or more channel audio signals". Combining signals is well known in the art. It

would have been obvious to combine the signals as claimed for the benefit of producing

a left and right combined signal.

Regarding **claim 32**,the combination of the applicant's admitted prior art and

Begault meet all elements of that claim, as stated above in apropos of claim 24, with the

exception of computer readable medium including an instruction for combining said left

signal and said right signal with other two or more channel audio signals.   Sibbald

discloses plural sound processing where a left and right channel (36 and 38) are added

to equalized left and right signal (44 and 46) using adders 48 and 50. This reads on

"combining said left and said right signal with other two or more channel audio signals".

Combining signals is well known in the art. It would have been obvious to combine the

signals as claimed for the benefit of producing a left and right combined signal.

Claim 33 claims the computer readable storage medium of claim 32, wherein

said set of instructions for combining said left and right channel with two or more

channel audio signals comprises a set of instructions for combining adding respective

contents of said left channel and said right channel to corresponding channels of said

other two or more channel signals. The combination of the applicant's admitted prior

art, Begault and Sibbald meet all elements of claim 22. Combining the signals as

claimed in 32 inherently includes adding respective contents of said left and said right

channel as claimed. Thus it would have been obvious to one of ordinary skill in the art

at the time of the invention to combine the left and right signals with two or more other

channel audio signals for the benefit of producing a left and right combined signal.

Regarding **claim 42**, the combination of the applicant's admitted prior art and

Begault meets all elements of that claim, as stated above in apropos of claim 34, with

the exception of the apparatus further comprising a means for combining said left signal

and said right signal with other two or more channel audio signals. Sibbald discloses

plural sound processing where a left and right channel (36 and 38) are added to

equalized left and right signal (44 and 46) using adders 48 and 50. This reads on

"combining said left and said right signal with other two or more channel audio signals".

Combining signals is well known in the art. It would have been obvious to combine the

signals as claimed for the benefit of producing a left and right combined signal.

Claim 43 claims the computer readable storage medium of claim 42, wherein

said means combining comprises means for adding respective contents of said left

channel and said right channel to corresponding of said other two or more channel

signals. The combination of the applicant's admitted prior art, Begault and Sibbald meet

all elements of claim 42. Combining the signals as claimed in 32 inherently includes

adding respective contents of said left and said right channel as claimed. Thus it would

have been obvious to one of ordinary skill in the art at the time of the invention to

combine the left and right signals with two or more other channel audio signals for the

benefit of producing a left and right combined signal.

Regarding **claim 52,** the combination of the applicant's admitted prior art and Begault meets all elements of that claim, as stated above in apropos of claim 45, with the exception of combining said left signal and said right signal with other two or more channel audio signals. Sibbald discloses plural sound processing where a left and right channel (36 and 38) are added to equalized left and right signal (44 and 46) using adders 48 and 50. This reads on "combining said left and said right signal with other two or more channel audio signals". Combining signals is well known in the art. It would have been obvious to combine the signals as claimed for the benefit of producing a left and right combined signal.

Claim 53 claims the audio signal of claim 52, wherein said step of combining adding respective contents of said left channel and said right channel to corresponding channels of said other two or more channel signals. The combination of the applicant's admitted prior art , Begault and Sibbald meet all elements of claim 52. Combining the signals as claimed in 52 inherently includes adding respective contents of said left and said right channel as claimed. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the left and right signals with two or more other channel audio signals for the benefit of producing a left and right combined signal.

Conclusion

9.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Devona E. Faulk whose telephone number is 571-272-

7515. The examiner can normally be reached on 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for

the organization where this application or proceeding is assigned is 703-872-9306. On

July 15, 2005, the central fax number will change to 571-273-8300.

Information regarding the status of an application may be obtained from the

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Business Center (EBC) at 866-217-9197 (toll-free).

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
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